



Programmable DC Power Supply
ModBus-RTU Commands V01

The power supply is equipped with USB interface, supporting Modbus-RTU protocol. There is PC software to facilitate remote control by PC.

1. Introduction to Communication Interface

- 1) Interface: USB
- 2) Communication format: 1 start bit, 8 data bit, 1 stop bit (fixed)
- 3) Baud rate: 9600, 19200 (set through front panel)
- 4) Communication mode: Master/Slave
- 5) Command length: 8 bytes
- 6) Instrument address: 1-250
- 7) Data byte: 16 bit

2. Data

The command frame consists of four parts: address, function code, data, and error check.

To ensure reliability during communication, time interval between each frame shall be more than 3.5 times of single byte character transmission time. For example, baud rate as 9600, time interval between each frame shall be more than $11 \times 3.5 / 9600 = 0.004s$.

The power supply uses Bidirectional asynchronous communication, fixed with 1 start bit, 8 data bits and 1 stop bit. It supports two baud rates: 9600 and 19200.

3. Function Code

A function code is single byte hexadecimal number. Following two functions are available.

Function code	Description
0x03	Read holding register(s), read data addressing by byte.
0x06	Write single register, write data addressing by byte.

4. Error Check

The power supply uses Cyclic Redundancy Check (CRC). The CRC result is in single byte, high byte following low byte. The CRC result is generated in below way.

- a) Set a 16-bit CRC register, with initial value as 0xFFFF.
- b) Set the 1st bit (address) in the data frame in bitwise XOR with 8 low bytes of CRC, and then save into CRC register.
- c) Move the CRC register to the right by 1 bit. Check if the moved out lowest order is 1 or not. If it is 1, set the CRC register in XOR with fixed number 0xA001.
- d) Repeat step c for 8 times.
- e) Repeat steps b, c and d from the next byte of the data frame, until the last data frame in the data field.
- f) The rest contents in the CRC register are the final checking value. Add the checking value to the last data in the data frame, 8 high bytes following 8 low bytes.

If data checking error happens during receiving data, the power supply returns ID + error code + checking code.

5. Complete Command Frame

Read Holding Register

Request frame	Data length	Value
Address	1	1~250
Function code	1	0x03
Start address	2	0~0x9999
Register number	2	n=1-4
Check code	2	
Reply frame	Data length	Value
Address	1	1~250
Function code	1	0x03
Byte number	1	2*n
Data	2*n	
Check code	2	
Exception frame	Data length	Value
Address	1	1~250
Function code	1	0x83
Exception code	1	1~5
Check code	2	

Example:

The power supply is 36V6A, communication address: 250

To read the power supply's output voltage VS, register address of VS is 0x0010

Send request: FA 03 00 10 00 01 90 44

Sample reply: FA 03 02 0E 10 58 3C

0E 10 is the read back voltage value

HEX 0E 10=Decimal value 3600, hence the output voltage is 36.00V.

Write Register

Request frame	Data length	Value
Address	1	1~250
Function code	1	0x06
Register address	2	0~0x9999
Data	2	
Check code	2	
Reply frame	Data length	Value
Address	1	1~250
Function code	1	0x06
Register address	2	0~0x9999
Data	2	0~0xFFFF
Check code	2	
Exception frame	Data length	Value
Address	1	1~250
Function code	1	0x86
Exception code	1	1~5
Check code	2	

Example:

The power supply is 36V6A, communication address: 250

To set output voltage at 10V, register address of VSET is 0x0030

Send request: FA 06 00 30 03 E8 9C F0

Normal reply: FA 06 00 30 03 E8 9C F0

HEX 03E8= Decimal value 1000, hence the voltage is set 10.00V

5-1. Register Address Assignments

Name	Address	Byte	Attribute	Description
OUTPUT	0x0001	2	W/R	OUTPUT ON=0x0001 OUTPUT OFF=0x0000
PS	0x0002	2	R	Protection status =0x0001 Normal=0x0000
Model	0x0003	2	R	Model number register, u16 type
DP	0x0005	2	R	Decimal point number of V_A_W, read by bit
VS	0x0010	2	R	Voltage register
IS	0x0011	2	R	Current register
PSH	0x0012	2	R	Power register, high byte
PSL	0x0013	2	R	Power register, low byte
OVSET	0x0020	2	W/R	OVP register
OPSETH	0x0022	2	W/R	OPP register, high byte
OPSETL	0x0023	2	W/R	OPP register, low byte
VSET	0x0030	2	W/R	Setting voltage register
ISET	0x0031	2	W/R	Setting current register
ADD	0x9999	2	W/R	Address register

5-2. Frequently Used Functions

Voltage setup:

Operation	Register Name	Value	Description
Write Register	VSET	0~0xFFFF	Required

Current setup:

Operation	Register Name	Value	Description
Write Register	ISET	0~0xFFFF	Required

Enable output:

Operation	Register Name	Value	Description
Write Register	OUTPUT	0x0001	Required

Disable output:

Operation	Register Name	Value	Description
Write Register	OUTPUT	0x0000	Required